Information Paper 16 October 1998

I. SUBJECT. Space Heaters in Tents, Shelters, and Other Inhabited Spaces.

II. MAJOR POINTS.

1. Issue. Commanders have expressed concerns about providing safe and adequate heat in subject spaces. Many have bought and continue to buy commercial unvented kerosene heaters.

2. Reference. a. Memorandum (6th End), STRNC-USOE, dated 8 Mar 89, subj: Recommendation to Modify CTA 50-909.

b. TM 10-4500-200-13 (w/changes 1-16 or most current), Heaters, Space: Radiant-type portable.

c. AR 600-55, Motor Vehicle and Equipment Operator Selection, Training, Testing and Licensing.

d. TM 9-4520-257-12&P, w/Change 2, Operator's and Unit Maintenance Manual for Heater, Space, Radiant, Large (H-45) (Type I, Solid Fuel)(NSN 4520-01-354-1191) (TYPE II, Liquid Fuel)(4520-01-329-3451).

e. Message, Ground Precautionary (GPM), GPM-SSCOM-97-01 (Operational), Subject: Fuel Fired Space Heaters.

f. Message, CDRATCOM, DTG 021048ZSEP93, Subject: Safety-Of-Use Message (SOUM), SOU-ATCOM-93-009, Use of all Types of Heaters in Small Military Standard or Commercial Tents used by the U.S. Military.

3. Facts.

a. A new family of space heaters is coming into the system, designed as replacements for the older MOGAS-burning stoves:

(1) Space Heater Convective (SHC) is a 35KBTU heater that provides forced hot air circulation without using a generator. Designed for Modular Command Post System Tents, TOCs and other tents housing expensive electronics, it can operate inside or outside the tent, and delivers clean, breathable heat from multiple liquid fuels, including JP8 and diesel. It weighs 67 lbs., provides clean combustion, reduced fuel costs, and lower maintenance requirements. The NSN is 4520-01-431-8927. The current price is $2,500.00.

(2) The Space Heater Medium (SHM or H45) is a 45KBTU heater for all General Purpose tentage and TEMPER tents. The SHM replaces the M1941, which is antiquated, has severe operational deficiencies, and poses a serious hazard in the field. The SHM weighs 70 lbs., and is certified to burn nearly all types of liquid fuel as well as wood and coal. The assigned NSN is 4520-01-329-3451. The current price is $535.09. This heater is superior to

the M1941 in cleanliness, ease of use, ruggedness, lower maintenance, less fire risk, and greater fuel availability.

(3) The Space Heater Arctic (SHA) is a 22KBTU heater designed to provide heat for the 10-man arctic tent and other tentage with floor area between 100 and 200 square feet. The SHA replaces the current M1950 Yukon heater, which has severe operational deficiencies and hazards similar to the M1941. The SHA weighs 35 lbs., and burns nearly all types of liquid fuels, as well as wood and coal. The assigned NSN is 4520-01-444-2375. Current price is $350.00. It is superior to the M1950 in cleanliness, ease of use, maintenance, and fire risk. In addition, all accessory components, including a telescoping stove pipe, can be stored inside the heater for easy mobility and assembly.

(4) The Thermoelectric Fan (TEF) is designed for use with standard military heaters to produce more uniform heat in shelters, reducing fuel use and increasing soldier comfort. It is compact, rugged, and lightweight (12 lbs.). It sits on top of heaters, and converts stove heat into electricity to power a 450cfm fan. The fan blows air downward for better heat circulation. Heaters can typically run at lower settings. The assigned NSN is 4140-01-457-2790. The current price is $350.00.

(5) The Space Heater Small (SHS) is a 12KBTU heater designed to provide heat for the Soldier Crew Tent (5-man) and other tentage with floor space between 80 and 100 square feet. It burns nearly all types of liquid fuel. It meets a heating requirement previously unmet by Army heaters. The SHS has an integral fuel tank and nested smoke stack, eliminating hoses, gravity feed adapter, fuel can, fuel can stand, and separate stack. It is easy to deploy and assemble. It has no assigned NSN at this point. Soldier Support Command (SSCOM) successfully tested initial prototypes. Current proposed fielding date is 1QFY01. Interested commanders should make their interest known through supply and command channels.

(6) A small, lightweight (3lbs) combination heater/ lantern/ stove known as the HOTPACK heater is in concept stage within SSCOM, to provide heat to small 2-4 man shelters. It is designed to be carried by soldiers in rucksacks or vehicles, burn JP-8 and vent the byproducts outside the tent. There is no current TRADOC requirement for the item. Interested commanders should make their requirements known through command channels to the Directorate for Combat Development at the Combined Arms Support Command (CASCOM) to support this heater.

b. Leaders should consider three general categories of hazards when considering and selecting fueled space heaters:

(1) Fires and burns caused by contact with or close proximity to the flame, heating element or hot surface area.

(2) Fires and explosions from flammable materials (fuels or other).

(3) Toxic by-products from burning fuels.

c. All fuel-powered heaters share the first two hazards. Vented heaters are designed to eliminate the third. Unvented heaters create the third hazard when operated in any poorly-ventilated space. The major pollutants from unvented kerosene and propane heaters are carbon monoxide, nitrogen dioxide, sulfur dioxide, carbon dioxide and some respirable particles.

d. Health effects from unvented heater pollutants.

(1) **Carbon Monoxide.** Interferes with the delivery of oxygen throughout the body. Fetuses, infants, and people with anemia or with a history of heart disease may be especially sensitive to carbon monoxide.

(a) Low to moderate concentrations: headaches, nausea, dizziness, weakness, and confusion; symptoms sometimes confused with the flu.

(b) High concentrations: death.

(2) **Nitrogen Dioxide.** Irritates the skin and the mucous membranes in the eye, nose, and throat. In addition, nitrogen dioxide may increase susceptibility to disease such as bronchitis. People with chronic respiratory disease including bronchitis, asthma, and emphysema may be especially sensitive.

(a) Low to moderate concentrations: slight irritation

(b) High concentrations: burning and chest pain; coughing and short breath.

(3) **Respirable particulates** released from incomplete combustion, can lodge in the lungs. These small particles may contain carcinogenic compounds .

(a) Low to moderate concentrations: irritate or damage lung tissue.

(b) High concentrations: same as low to moderate.

e. In reference a, The U.S. Army Natick Research, Development and Engineering Center (hazards and replacement stove), disapproved I Corps adding unvented kerosene heaters to its TDA, as well as using unvented heaters in field tents due to the hazards associated with noxious exhaust gases, even with “clean” fuels such as 1-K kerosene. Natick prohibited the use of unvented heaters in buildings used for human habitation, as well as in human-inhabited shelters/tents/ equipment in the field. This was reinforced by references e and f.

f. Commanders who do not have the current Army space heaters described in paragraph 3a in their inventories are faced with a risk decision involving use of obsolete-but-

approved vented space heaters, or purchasing and using unauthorized alternate systems, such as commercial kerosene or propane. Factors include:

(1) Older vented systems such as the M1941 pot-belly and the M1950 Yukon are designed with MOGAS as their primary fuel, and are known to be hazardous, especially for fires, owing to both design and operational factors. Commercial kerosene and propane heaters eliminate some of the fire hazards, but pose additional health hazards.

(2) Commercial propane heaters pose packaging and control challenges for safe and legal movement of propane fuel containers during deployments.

(3) Commercial propane and kerosene heaters both use non-standard fuels.

g. Local POC for information on space heaters is Mr. A.S. Lernyei, ATCOM LAO, 967-7577/3008. He has information and is willing to assist. Source of supply is the Defense Construction Supply Center (S9C), ATTN: DCSC-OSEK, P.O. Box 3990. Columbus, Ohio, 43216-5000. DSN: 850-3017. Comm: 614-692-3017. Item Manager at DLA is Mr. Jerry Ford, DSN: 850-1197.

III. STAFF COORDINATION: G1, G3, G4, LAO.

IV. ISSUES/STAFF CONCERNS: Need to heat existing spaces without relying on older generation space heaters. Commanders want to be able to use kerosene or propane heaters while in transition to the new family of space heaters.

V. RECOMMENDATIONS: Recommend Commanders:

a. Continue replacing M1941, M1950, and other older heaters with the new generation stoves.

b. Closely adhere to the standards in reference b for operating and maintaining the M1941 and M1950 space heaters.

c. Use the attached Purchasing, Operating and Maintenance Guidance for any commercial kerosene or propane heaters they obtain.

d. Ensure that all space heater operators are trained to the appropriate -10 or other operator manual standards and licensed per paragraph 7-1, reference c.

Released and Approved by: Mr. Peter F. Strohm
Safety Director
7-3079/6764

Subject: Space Heaters in Tents, Shelters, and Other Inhabitable Spaces.
Date: ~~8 November 1996~~16 October 1998

Risk Management Guidance
Unvented Kerosene and Propane Heaters

A. Purchasing.

1. Make sure heater has guards around flame area or heating section.

2. Look for a manual shut-off override switch.

3. Buy only heaters clearly tested and labeled by a nationally-recognized testing laboratory (such as Underwriter's Labs)

4. For kerosene heaters, buy and use 1-K (low-sulfur) fuel **only,** from a dealer who can certify that the fuel is 1-K kerosene. The fact that kerosene is "water clear" does not ensure 1-K. both 1-K and 2-K can appear clear.

B. Operation

1. Read and follow manufacturer's operating guidance. Keep manuals available to operators.

2. Keep any interior doorways open while using. This helps prevent pollutant buildup and aids combustion. Maintain a constant supply of fresh air into the space.

3. Prohibit use of unvented heaters in sleeping areas.

4. Keep heaters at least three feet from combustible materials.

5. Make sure heater is on a level surface.

6. Keep all flammable fuels outside and, if possible, downhill from the heater. Keep kerosene outside in a sealed container clearly labeled "Kerosene". Keep propane cylinders stored in a sealed container labeled “Propane”.

7. Refuel heaters outside, and only when cooled.

8. Use only 1-K (low sulfur) kerosene fuel. Never use any gasoline in kerosene heaters. Even small quantities in the tank can cause fire.

9. Never fill liquid fuel tanks beyond the full mark. Expansion from heat can lead to spills.

10. Do not move, remove, or refuel the heater when operating or hot.

11. In case of flare-up or uncontrolled heating, do not try to move the heater. If the heater has a manual shut-off, activate it to turn off the heater. Do not try to extinguish the fire with water or blankets. If you have no shut-off, or if it fails to put out the flame, clear the area and call fire fighters.

12. Always have a fire extinguisher available.

C. Maintenance

1. Keep heaters adjusted and clean, following manufacturer's guidance.

2. Keep heaters maintained. Replace missing guards and controls at once.

3. Do not operate defective units. Have repairs done by qualified repair people.